



Pickled Fish and Salted Provisions

Historical Musings from Salem Maritime NHS



The Great Age of Duck

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On the cover:

Duck is one of the many types of fabric that are in the Public Stores as part of the exhibit on the goods that were imported through Salem in the early nineteenth century.

Duck, a word encompassing widely diverse meanings, has profound importance to maritime history and the spread of civilization. We think of an inherently entertaining aquatic bird that inspired the concept of quickly disappearing from view. To duck for apples, to duck in, to duck out, to duck an issue; these are actions based on the behavior of a duck. What does this have to do with ships? Absolutely nothing, other than, with luck, the ship will shed water “like a duck’s back.”

However, the word duck has been associated with ships for centuries. And it seems that, as in the case of duck (duct)-tape, it has to do with the way words sound rather than the actual intended meaning. The Dutch word for sailcloth is “zeildoek.” Doek is Dutch for cloth (generically) and zeil becomes sail in English. It does not overly strain the imagination to see a correlation; particularly when Holland was a major supplier of sailcloth and raw materials, trading in flax and hemp for hundreds of years. Eventually, “the word “duck” became associated with a heavy fabric and was applied to cotton canvas when it was first manufactured in the United States.”¹

Linen Sails

The most popular fabric for sails from the earliest times through the mid-nineteenth century was finely woven linen made from flax, but a more coarsely woven fabric made from hemp was also widely used. Examples of sails survived aboard the wreck of the newly-launched Swedish man-of-war *Vasa* that sank in Stockholm Harbor in 1628. Archeological analysis of two sails indicated a closely textured fabric in a smaller sail, and a coarser weave in a larger sail, but “the condition of fibers was so poor that it was not possible to determine if they were of flax or hemp. It seemed likely that the coarser cloth at least was hemp cloth and the finer one linen.”²

Duck Standards

The widths of the cloth varied over time, and presumably the capacity of available looms often determined the dimensions of the finished goods. The width of the cloth itself combined with the number of seams, determines the strength and deformation resistance of a sail. Wolfram zu Mondfeld addresses the widths of sailcloth in his compendium of obscure information for model shipbuilders. “The cloths themselves were up to 4 ft. wide in the early middle ages, 32 to 36 inches wide in the late Middle Ages, around 28 inches wide from the middle of the 16th century to the beginning of the 18th century, and from then 24 or 18 inches; the width of the seams fell over the same period from 1 ½ to 1 inch.”³

According to *Fairchild's Dictionary of Textiles*, prior to the mid-nineteenth century, when sailcloth was imported it would be trademarked for positive identification. "The light flax sail fabrics imported mostly from England and Scotland bore the trademark stencil of a raven [commonly referred to as ravens duck at the time] while the heavier weights bore the trademark picturing a duck."⁴

Standards for British manufactured sailcloth were enacted in 1746. In addition to requiring British sail makers to mark each new sail with his name and address, the size of a bolt of sailcloth was standardized at twenty-four inches wide by thirty-eight yards long.⁵ Sails were stitched up from multiple strips of sailcloth, and edged with hemp bolt-ropes to keep their shape and distribute stress along the extremities of the sail, and provide anchor-points for rigging components.

A Strategic War Materiel

During the Age of Sail, duck was the equivalent of today's gasoline and diesel fuel as a strategic war materiel. Without it, ships did not move. This was of crucial importance to nations at war, and control of its availability could influence the outcome of naval engagements. The British Navigation Acts required that duck originating in Holland and the other major source of production, Russia, be assessed for duties by being imported by way of England into the American colonies. The opening of the American Revolution put an end to the plentiful importation of duck through the usual British sources, however Holland and Russia duck was aggressively smuggled into the colonies through clandestine channels along with other desperately needed supplies such as muskets and gunpowder. The inflated cost and risk entailed in securing sailcloth in 1775 caused Congress to encourage its domestic manufacture, but shortages persisted.

The Salem Duck Manufactory

Enticed by a state bounty, the Boston Sail Cloth Manufactory was incorporated prior to 1789. It operated through the mid-1790s, when the bounty expired, and despite respectable production efforts, apparently it did not make enough profit to stay in business without the subsidy. A number of early attempts to operate sailcloth factories at other locations were also less than fully successful.⁶

In 1799, Salem's venture into the world of duck production got a small, but welcome, boost with the building of the frigate *Essex* at Winter Island.⁷ The Salem Duck Manufactory had been established in 1790 at what is now the intersection of Summer and Broad Streets. In spite of the rapidly growing United States trade with Russia and western Europe, the competing demands of the navies of Britain and France for supplies of sailcloth and naval stores caused the duck factory to experience problems obtaining the flax required to weave the cloth and the company barely managed to survive until 1799, when the contracts for *Essex's* sails, awnings, hammocks, and tarpaulins were let. There was a tempo-

rary flurry of activity, but the lack of raw material continued to be a problem. The contracts with the manufactory had to be augmented with such imported duck as could be found in storage.⁸

Linen vs. Cotton

While imported flax sailcloth remained popular and trusted through the mid-years of the nineteenth century, cotton sail duck production in the United States began prior to the War of 1812. The first production of American manufactured cotton sail duck is attributed to Seth Bemis's mill at Watertown, Massachusetts. In 1812 the supply of imported duck was cut off (just as it had been during the Revolution), but domestically grown sea island (off the Georgia coast) cotton now enabled a supply of sailcloth to be maintained. Selling for about one dollar per yard, scarcity and high demand brought Bemis a profit approaching sixty cents per yard on his investment, over one hundred percent return. The price of duck went down with the introduction of the power loom during the 1820s and by 1831 it was selling at thirty-five cents per yard.⁹ By mid-century, millions of yards of duck were being produced, largely in Massachusetts, New Jersey, and Baltimore, Maryland.

The change-over from flax to cotton sail duck in the navy proceeded slowly, as more conservative elements did not trust the newer fabric to perform as well as the traditional flax canvas with its centuries of proven dependability and predictable characteristics. The U. S. Navy conducted tests and the results were inconclusive as to which material was better. Both materials had qualities better suited to specific purposes, and were frequently used in conjunction with one another, both in the navy and commercially.

As sailing ships grew ever larger, the demand for sail duck increased accordingly. There were still occasional shortages, but by 1858 the production capacity finally exceeded the demand. Reaching a saturation point, the mills suffered economic recession.¹⁰ At the same time, the construction of large ocean-going freighters declined following the depression of 1857.

The Decline of Duck

A respite in the decline of the American merchant marine under sail followed the end of the Civil War, particularly in New England, when large vessels that came to be known as down-Easters carried on overseas trade. However, by the early years of the twentieth century these ships found themselves more and more relegated to the coasting trade and inland waterways. The higher cost of operating vessels under the United States flag made it harder to compete with foreign shipping. Sailing vessels, both American and foreign, with their huge expanses of canvas quickly lost their place to steamships, and many were the helpless victims of submarine warfare during World War I. The cause of the United States merchant marine was advanced by the war effort, but the vessels required were steam freighters.

With the advance of technology the need for sailcloth to power commercial shipping ended. Although duck is still manufactured for many purposes under many different names, including Oceanus™, a synthetic substitute used aboard the National Park Service's own tall ship *Friendship* of Salem, the Great Age of Duck ended with the Great Age of Sail.

Notes

¹ Dr. Isabel B. Wingate, ed., *Fairchild's Dictionary of Textiles* (New York, 1967), p.199

² Sven Bengtsson, "The Sails of the *Vasa*," *The International Journal of Nautical Archaeology and Underwater Exploration* (1975), Vol. 4. No. 1, p.33

³ Wolfram zu Mondfeld, *Historic Ship Models* (New York, 1989), p.256

⁴ Wingate, p.99

⁵ J.W. Norie, *The Elements and Practice of Rigging, Seamanship, and Naval Tactics, Including Sail Making ,Mast Making, and Gunnery* (London, 1821), Vol. II, p. 149

⁶ Elton W. Hall, "Sailcloth for American Vessels," *The American Neptune* (Salem, 1971), Vol. XXXI, No. 2, p. 135

⁷ The frigate *Essex* (built at Salem, Massachusetts) was one of eight warships built with funds subscribed by private citizens to augment a nearly non-existent United States Navy during the Quasi-War with France (1798-1801). The other vessels were *Merrimack* (Newburyport), *Maryland* (Baltimore), *Patapsco* and *Philadelphia* (Philadelphia), *Boston* (Boston), *New York* (New York), *Richmond* (Richmond), and *John Adams* (Charleston).

⁸ Philip Chadwick Foster Smith, *The Frigate Essex Papers: Building the Salem Frigate 1798-1799* (Salem, 1974), p. 89, 90, 297

⁹ Hall, pp. 135, 136

¹⁰ *Ibid*, p.142



Above: the sails of *Friendship*, the replica tall ship at Salem Maritime NHS, are made of modern materials, but replicate the look of the duck that would have been used on the original vessel.

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